B. TECH.
EIGHTH SEMESTER EXAMINATION, 2003-2004
DISTRIBUTED SYSTEM

Time : 3 Hours   *Total Marks : 100*

Note : Attempt **ALL** questions.

1. Attempt any FOUR parts :—   (5×4=20)

    (a) What are Distributed Systems ? What are significant advantages and limitations of Distributed System ? Explain with the example, what could be the impact of absence of global clock and shared momory.

    (b) What are the fundamental issues in Resource Management in Distributed System ? Explain the difference between Data Migration, Computation Migration and Distributed Scheduling.

    (c) What are Lamport's Logical Clocks ? List the important conditions to be satisfied by Lamport Logical Clocks. If A and B represent two distinct events in a process and if $A \rightarrow B$, then $C(A) < C(B)$ but vice versa is not true. Explain the reasons.

    (d) What do you mean by Casual Ordering of Message ? If process P sends two messages M_1 and M_2 to another process Q, what problem may arise if the two messages are not received by recipient Q in the order they were sent by process P ? Develop an algorithm which guarantees the casual ordering of message in Distributed System.
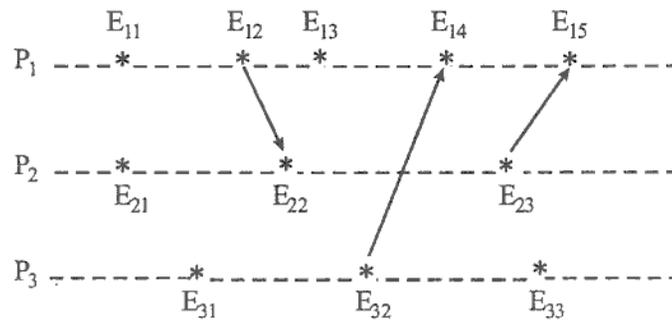
(e) What are Vector Clocks ? What are the advantages of Vector Clock over Lamport Clock ? For the space-time diagram shown below, obtain the vector time stamp of various events.

(f) What do you mean by Distributed Mutual Exclusion ? A simple solution to this problem may be obtained by having a designated site called Control Site which receives all requests and grants permisson to execute critical section. Discuss the limitation of this approach. Discuss any protocol, which uses the time stamp to order critical section request and resolve conflict in simultaneous request for critical section execution.

2. Attempt any TWO parts :—   (10×2=20)

(a) What is the problem of distributed deadlock detection ? What are the differences in Centralized, Distributed and Hierarchical control organizations for distributed deadlock detection ? What are the advantages of Distributed Control Organization over Centralized Control Organization for distributed deadlock detection ?

(b) What are Phantom Deadlocks ? What are the shortcomings of Ho Ramamoorthys Two Phase algorithm for deadlock detection ? How does One Phase algorithm remove the possibility of false deadlock detection ?

(c) What are Agreement Protocols ? Discuss the general system model where agreement protocols are used. What are Agreement and Validity objectives of Byzantine Agreement problem ?

3. Attempt any TWO parts :—   (10×2=20)

(a) What do you mean by Distributed Objects ? Explain the concept of remote method invocation with a suitable example. How are the parameters and results passed to a remote procedure ? Explain with a suitable example.

(b) What are Cryptographic Systems ? Give a general model of a cryptographic system listing its objectives. What are Public and Private keys ? List the key differences and issues in Public Key Cryptography and Private Key Cryptography.

(c) What are the goals of Distributed File System ? What are the different mechanisms for building distributed file systems ? Explain the salient features of Mounting and Caching process.

4. Attempt any TWO parts :—   (10×2=20)

(a) What are Distributed Databases ? What are the advantages of Data Distribution and Data Replication ? Explain the difference between Horizontal and Vertical

Fragmentations. If data object replicas are stored at multiple number of sites, explain how the lock will be acquired by a transaction on the data object.

(b) What are Locks ? What are the essential differences in the Lock-based protocols and Time Stamp-based protocols ?

(c) What are Commit Protocols ? Explain how Two-Phase Commit Protocol responds to Failure of Participating Site and Failure of Coordinator.

5. Attempt any TWO parts :—   (10×2=20)

(a) What are the differences in Centralized and Distributed Algorithms ? How is the performance of a distributed algorithm evaluated ? Explain the term, Message Complexity in reference to distributed algorithm.

(b) What is Routing ? Discuss the Correctness, Complexity, Efficiency and Robustness criteria of a good routing algorithm. What is Destination-based Routing ?

(c) What are Wave and Traversal Algorithms ? Explain the Termination, Decision and Dependence requirements of a Wave Algorithm.

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